

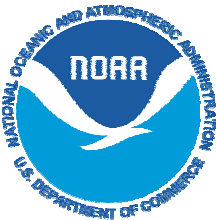


# **Working Groups**

Workshop on

## **Ecosystem-Based Decision Support Tools for Fisheries Management**

14-18 February 2005  
Key Largo, Florida





## **Working Groups**

For the purposes of the workshop, a schematic representation of a science-support system informing EAF is developed. The components of the scheme include:

1. Data / Information
2. Indicators / Reference Points
3. Functional Relationships among system components
4. Models and forecasts
5. Science supporting governance systems
6. Social science aspects supporting ecosystem approaches

**Working Group participants and some issues considered:**

### **Indicators/Reference Points**

Jason Link  
Kerim Aydin  
Marie-Joelle Rochet  
Kathy Mills  
Steve Brown

Much current research and discussion has centered on the development of suites of indicators such as richness/diversity indices, trophic levels, balance among components of biological systems, economic/social performance indicators, etc. A recent SCOR/IOC workshop ([www.ecosystemindicators.org](http://www.ecosystemindicators.org)) reviewed the use of candidate indicators. There are important links between the selection of potential indicators, and data/information supporting routine assessments of the state of the ecosystem relative to the indicators. Similarly, there are important links between indicators and models that evaluate the responsiveness of candidate indicators, and the consequences to the system of managing so as to achieve desired levels of various indicators

### **Data/Information Needs**

Pat Sullivan  
Fred Serchuk  
Jim Cowan  
Bob Shipp  
Myra Brouwer  
Vishwanie Maharaj  
Tom Hoff  
Chad Demarest



Three main components of data/information needs include biological, social and physical. Biological data include standard information on the abundance, distribution and demography of various species. Additionally, in order to understand feedback effects, information on trophic interactions, habitat requirements and the degree of competition and predation among species is required. In order to evaluate the efficacy of MPAs and other place-based management measures, movement patterns and site-specific demographic information is required. Social sciences information required to evaluate ecosystem issues include revenue, profit and employment patterns by fishery and community. Observer data can provide information about fishery interactions. In order to understand how climate variability and trends interact with biological and social systems, information linking ocean variability, human disturbances and biological productivity are required. Importantly, medium- and long-term predictions concerning regime change are dependent on adequate suites of biological and physical measurements.

### **Functional Relationships**

Mike Fogarty  
Villy Christensen  
Bill Overholtz  
Chris Harvey  
Ned Cyr  
Josh Nowlis

Many of the important predictive capabilities necessary to inform management require the assumption of relationships among various biological, social and physical components of ecosystems. Simple examples currently in use are stock-recruitment relationships used to predict stock rebuilding for individual species. Providing similar predictions in a multispecies or ecosystem context requires more sophisticated relationships. Similarly, functional relationships among predators and prey, water mass characteristics and productivity, density and movement patterns, abundance and fishing effort distribution, predator and prey abundance and predation mortality rates, and other relationships are key components of model-based predictions. Validating functional relationships requires time series data for systems that have shown dynamic responses. In the absence of data, multiple plausible functional relationships may explain the observed relationships among some components, with potentially diverging predictions relative to policy choices.

### **Models**

Jon Brodziak  
Beth Fulton  
Jeremy Collie  
Phil Levin  
Clay Porch



Gerard Dinardo  
Beth Babcock

Quantitative models support resource management decision-making at many levels. Assessment models evaluate the current resource abundance and many aspects of population demography. A typical output of assessment models is the recent and historical rate of harvest. Multispecies models inform on the interdependence of species. Predictive models use current stock status from assessment model and estimates of recruitment to forecast short- (1-2 years ahead, medium- (3-10 years), and long-term (equilibrium) effects of management policy choices. Models can be used to evaluate the use of indicators, and to evaluate the consequences of policy choices for the biological and human components of the ecosystem. An important aspect of modeling is to inform on the consequences for policy choice outcomes of type II errors in underlying functional relationships used to construct models, and the impacts of data gaps and other process uncertainty (errors). Model robustness is evaluated using sensitivity analyses with frequentist approaches or Bayesian model approaches. Striking a balance between possible model states and informative and clear advice to managers is difficult when model uncertainty is high.

### **Science Supporting Governance Systems**

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Tony Smith  
Lee Anderson  
Ellen Pikitch  
Joe Powers  
Dave Dow  
Joe Kimmel  
Frank Parrish  
Tom Hoff

Information on the status of ecosystems, predictions about future ecosystem states, and evaluations of the consequences of management policy choices are used by the governance system to select management measures amongst numerous alternatives. These choices will, necessarily be made under greater levels of process and measurement uncertainty in an ecosystem context, as opposed to current species-by-species or fishery-by-fishery management schemes. How are management guidelines developed, using model predictions and indicators of ecosystem performance? What are the most important concerns of stakeholders and the public regarding ecosystem issues that would not be addressed if conservative single species or FMP management were pursued across the board? That information would be necessary to further inform those issues outside the current sphere of management? How does one approach a governance system for data poor situations vs. data rich situations?



## **Social Science Aspects Supporting Ecosystem Approaches**

Rita Curtis  
Kristy Wallmo  
Brad Gentner  
David Tomberlin  
Joe Terry  
Jim Kirkley  
Doug Lipton  
John Tschirhart  
Kathi Kitner

Social science needs are highlighted as a separate category for discussion for a number of reasons. First, there are ongoing discussions regarding the type and extent of issues to be included under an umbrella of EAF. Surveys of stakeholder groups and broader constituencies can help shape the discussion of what needs to be included in quantitative decision support tools. Second, the types of social science data requirements, models of functional relationships between human activities and biological resources, and indicators of performance from social perspectives have not been considered in detail. Finally, this discussion will provide an overview of issues to be included in social science survey instruments, and the revised survey instrument will be reviewed

## **Cross-cutting issues for all task teams:**

What spatial/temporal scales necessary for EAF?

How do definitions of regional ecosystems relate to information and modeling issues to support EAF?

What are appropriate quantitative assessments for management measures evaluation in an EAF context (models, indicators, data, functional relationships)?

What science-governance relationships are applicable to differing data models (e.g., data rich, data poor)? How does the precautionary approach fit in such a scheme?

How do we forge links between EAF and EAM, given scientific uncertainty in linkages between fishery resources and broader ecosystem processes and management institutions?



**Working groups were expected to evaluate these issues for each topic:**

- 1) What is the current state of the art in this discipline?
- 2) Are there appropriate experiences worldwide that demonstrate how research in this discipline can inform ecosystem-based fisheries management?
- 3) What new data, models or information management system are required to advance the discipline so that its products form the basis for ecosystem-based decision making (priority ranking)?
- 4) Based on the above, what changes in policy, governance, or science administration are required to more effectively inform on ecosystem approaches to fisheries